

**DUBAI ACCREDITATION DEPARTMENT**  
**REPORT ON PTP 199<sup>TH</sup> INTER-LABORATORY PROFICIENCY TESTING PROGRAM**  
**DETERMINATION OF DRINKING WATER ANALYSIS USING ULTRACHECK<sup>TM</sup>**  
**QUALITY CHECK SAMPLES- *Revision 1***

**Date: 25 January 2011**

**1. INTRODUCTION**

This document presents the results of the 199<sup>th</sup> inter-laboratory proficiency testing program conducted during the month of November involving the chemical analysis of drinking water by matching the analysis results of (CRM) reported by laboratories with the assigned values and advisory ranges in the certificates attached with **Ultra check<sup>TM</sup> Quality Check Samples (CRM)** with thirteen (13) participating laboratories.

This program is part of the Inter-laboratory Comparison Programs organized by Dubai Accreditation Department (DAC) of Dubai Municipality (DM) for monitoring the validity of test results of laboratories operating in Dubai as a requirement of the Law No. 2/2010 and ISO/IEC 17011: 2004.

**2. EXPERIMENTAL DESIGN**

**2.1 Participants:**

Thirteen laboratories were participated in this PTP including:

- One governmental laboratory.
- Nine are private laboratories operating in Dubai including accredited and/or registered laboratories.
- One private laboratory is from other Emirates.
- One laboratory is from Qatar.
- One laboratory is from Oman

**2.2 Samples tested:**

The following samples were distributed:

**2.2.1 ULTRA Check ® Trace Metals #1 QC Sample Catalog No. QCI-705A**

**2.2.1.1 Catalog No. QCI-705A, Code : 71356**

**2.2.1.2 Catalog No. QCI-705A, Code : 72901**

This ULTRA Check ® sample consisted of two sets of samples with different code number; assigned values and advisory range the results of the participants were evaluated as per the assigned value and advisory range in the certificate of the sample which was received as mentioned in appendix A.

This ULTRA Check ® sample was gravimetrically prepared and the analysis concentrations were confirmed using the analytical technique listed in the certificate

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attached with this report. The reference value represents the determined value when the sample has been prepared according to instruction.

### 2.2.2 ULTRA Check (™) Minerals Sample - Catalog No. QCI-710, Code No. 70752

This ULTRA Check (™) sample was gravimetrically prepared and the analysis concentrations were confirmed using the analytical technique listed in the certificate attached with this report. The reference value represents the determined value when the sample has been prepared according to instruction.

### 2.2.3 ULTRA Check (™) Water Hardness Sample - Catalog No. QCI-720 Code No. 78566

This ULTRA Check (™) sample was gravimetrically prepared and the analysis concentrations were confirmed using the analytical technique listed in the certificate attached with this report. The reference value represents the determined value when the sample has been prepared according to instruction.

### 2.2.4 ULTRA Check® Corrosivity QC Sample Catalog No. QCI-717 Code No. 77369

This ULTRA Check (™) sample was gravimetrically prepared and the analysis concentrations were confirmed using the analytical technique listed in the certificate attached with this report. The reference value represents the determined value when the sample has been prepared according to instruction.

## 2.3 Sample preparation:

Sample preparation is as per the enclosed ULTRACheck instructions.

## 3. CONFIDENTIALITY

Each laboratory is given a code number to maintain confidentiality of results and to protect their identities. Only the concerned laboratory knows its code number.

## 4. TEST METHOD

Instructions were given to the participants to test the samples as per the appropriate test method applied by the laboratory.

## 5. TEST RESULTS

5.1 Upon receipt of the test results from the participating laboratories, the sealed envelopes containing the Certificate of Analysis of the samples distributed were opened. The certified "Assigned value" and "Advisory Range" as given in the Certificates are shown in the second and third columns of Appendix A. Copies of the Certificates of Analysis are given in the Appendix B.

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- 5.2 The test results submitted by the participating laboratories are shown in the Appendix A. In order to protect the identities of the participating laboratories, each one was assigned a code number.
- 5.3 Appendix A also indicates whether the participating laboratory's results are within (Pass) or outside (Fail) the "Advisory Range".
- 5.4 The inter-laboratory comparisons is based on the number of parameters which are tested by the participants, however, pass/fail results which are highlighted in yellow color are calculated as per the number of parameter reported by the participant.
- 5.5 The results which are highlighted in brown color are near the borders of the advisory range limits and were not counted as outliers (Difference between the participant's result and the nearest limit of Advisory Range  $\leq 1\%$ ).

## 6. EVALUATION OF RESULTS

### Outliers Results

CRM No.	Test Parameter	Labs with Outlier Results
QCI – 717 (A+B) Code 77369	Alkalinity (as CaCO <sub>3</sub> )	Lab EX4; Lab 19; Lab EX10; Lab 4; Lab 37
	Calcium Hardness (as CaCO <sub>3</sub> )	Lab 49; Lab 2; Lab IN02
	PH	Lab 49; Lab 2
	Sodium	Lab 49; Lab EX10
QCI – 710 Code 70752	Alkalinity (CaCO <sub>3</sub> )	Lab 79
	Conductivity @ 25°C	Lab 19 ; Lab EX10; Lab 22
	Chloride	Lab 49; Lab EX4; Lab 28; Lab 79; Lab G02
	Fluoride	Lab EX10; Lab 4; Lab 22; Lab 37
	Sulfate	Lab EX9
	Nitrate as N	Lab 2; Lab EX4; Lab 79; Lab EX9; Lab4; Lab IN02 ; Lab 37
	Potassium	Lab EX10
QIC – 705A Code 71356	Aluminum	Lab EX10
	Arsenic - As	Lab EX4; Lab 37
	Chromium -Cr	Lab 4
	Cobalt – Co	Lab 28
	Iron - Fe	Lab 19; Lab 28; Lab 4
	Nickel - Ni	Lab 2
	Selenium - Se	Lab 37
	Vanadium - V	Lab 19; Lab EX10
QIC – 705A Code 72901	Zinc - Zn	Lab 2; Lab EX10
	Copper – Cu	Lab 22; Lab IN02
	Lead – Pb	Lab IN02
	Manganese – Mn	Lab IN02

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The test results provided by the above mentioned laboratories are outside assigned values and the advisory range limits. The above mentioned laboratories are requested to investigate the root cause of the outlier results, implement corrective action and a report shall be available upon need by the assessment team during the nearest assessment visit.

### Laboratories with results near the border limits of advisory ranges:

CRM No.	Test Parameter	Labs with Outlier Results
QCI – 720 Code 78566	Magnesium	Lab 79
QCI – 717 (A+B) Code 77369	Alkalinity (as CaCO <sub>3</sub> )	Lab EX10
	PH	Lab EX10; Lab 79
QCI – 710 Code 70752	PH	Lab 79; Lab 22
	Sodium	Lab EX4
QIC – 705A Code 72901	Selenium - Se	Lab IN02

Also the above listed laboratories reported their results of the above parameters near the borders of the advisory range limits which are highlighted with brown color in appendix A. These laboratories were not counted as outliers but as a warning limit; these laboratories are advised to investigate the potential root cause of such results and take the appropriate corrective action.

## 7. APPENDICES

7.1 Appendix A: Summary of results

7.2 Appendix B: CRM Certificates

7.2.1 ULTRA Check<sup>®</sup> Trace Metals #1 QC Sample Catalog No. QCI-705 A Code 71356

7.2.2 ULTRA Check<sup>®</sup> Trace Metals #1 QC Sample Catalog No. QCI-705 A Code 72901

7.2.3 ULTRA Check<sup>(TM)</sup> Minerals Sample - Catalog No. QCI-710, Code 70752

7.2.4 ULTRA Check<sup>(TM)</sup> Water Hardness Sample - Catalog No. QCI-720, Code 78566

7.2.5 ULTRA Check<sup>®</sup> Corrosively QC Sample Catalog No. QCI-717, (A+B) Code 77369

---- End of Report ----

**DETERMINATION OF DRINKING WATER ANALYSIS USING ULTRACHECK™ QUALITY CHECK SAMPLES**

**Appendix A: Summary of results**

S. No.	Parameters	Assigned/Reference Value	Advisory Range	Lab 49	Lab 2	Lab EX4	Lab 19	Lab EX10	Lab 28	Lab 79	Lab EX9	Lab 4 G02	Lab 22	Lab IN02	Lab 37	
<b>QCI - 720- Code 78566</b>																
1	Calcium	50.1 ± 0.5 mg/L	45.1 - 55.1	51.9	54	50.5	48.9	51.72	*	50.22	52.1	51.1	50.1	51	54.24	49
2	Magnesium	48.8 ± 0.5 mg/L	43.9 - 53.8	45.1	53	50.32	47.7	48	*	43.76	46.2	46.9	47.4	46	49.88	47
3	Total Hardness (as CaCO3)	326 ± 3 mg/L	293- 359	315.3	351	333	318.6	347.7	*	306	320	323	320	316	341	320
<b>QCI-717 (A+B)- Code 77369</b>																
4	alkalinity (as CaCO3)	34.2 ± 0.3 mg/L	30.8 - 38.2	33.5	32	42	41.1	38.6	*	37	36	40	35	38	34	39
5	Total hardness (as CaCO3)	136 ± 1 mg/L	121 - 151	154.1	108	135	132.7	139.7	*	127	128	133	134	130	166	137
6	PH	9.18 ± 0.01 mg/L	8.98 - 9.38	8.71	8.40	9.10	9.16	8.90	9.10	8.90	9.22	9.02	9.10	9.11	9.12	9.00
7	total filterable residue	388 ± 7 mg/L	249 - 526	341	313	316	398	286.8	260	263	289	338	268	378	279	338
8	Sodium	15.7 ± 0.2 mg/L	13.8 - 17.3	13.2	16	16.96	15.4	12.5	*	*	15.9	15.9	16	16	16.8	17
<b>QCI-710- Code 70752</b>																
9	Alkalinity (CaCO3)	339 ± 3 mg/L	359 - 439	385	388	393.8	410.5	397.4	*	277	384	418	374	412	367	416
10	Conductivity @ 25°C	1210 ± 1 µmhos/cm	1140 - 1280	1236	1249	1248	1373	1295	*	1245	1256	1246	1239	1336	1246	1210
11	PH	9.15 ± 0.01	8.95 - 9.35	9.01	9.00	9.14	9.23	9.20	9.10	8.90	9.32	9.18	9.15	9.36	9.18	9.20
12	Chloride	11.6 ± 0.4 mg/L	10.0 - 14.2	14.8	13	15.24	13.1	12.6	25	17	12	11.7	14.5	12	10.07	10.9
13	Fluoride	2.54 ± 0.01 mg/L	2.25 - 2.84	2.51	2.6	2.44	*	2.1	*	2.38	2.5	2.2	2.58	4	2.29	2.2
14	Sulfate	194 ± 1 mg/L	172 - 214	190.2	193	185.2	194	200	187	186	216	200	191	193	210.97	185.1
15	Nitrate as N	9.62 ± 0.15 mg/L	8.18 - 10.92	9.24	42	31.78	*	9.2	*	0.2	7.8	32	*	9	32.30	36.6
16	Sodium	200 ± 2 mg/L	180 - 220	216.2	213	220.5	213.9	209.3	*	*	210	213	206	212	210	220
17	Potassium	154 ± 1 mg/L	138 - 173	144	146	166.5	139.2	128.6	*	*	161	164	155	154	166	172
<b>QIC-705A - Code 71356</b>																
18	Aluminium -Al	3500 ± 35 µg/L	3092 - 3860	*	3559	3276	3180	1820	*	-	3640	*	3458	-	-	*
19	Arsenic- As	150 ± 2 µg/L	131 - 169	*	156	24.27	*	*	*	-	142	*	*	-	-	196.0
20	Cadmium - Cd	750 ± 8 µg/L	675 - 825	749	741	758	730	750	704	-	803	740	772	-	-	745.0
21	Chromium - Cr	200 ± 2 µg/L	180 - 220	*	210	214	220	190	199	-	203	170	194	-	-	195.0
22	Cobalt - Co	30.0 ± 0.03 µg/L	26.4 - 33.1	*	32	31	30	30	< 106	-	31	*	29	-	-	31.0
23	Copper - Cu	800 ± 8 µg/L	720 - 880	799	797	815	750	840	744	-	825	820	815	-	-	814.0
24	Iron - Fe	250 ± 3 µg/L	225 - 276	253	252	265	220	270	217	-	260	220	244	-	-	248.0
25	Lead - Pb	1500 ± 15 µg/L	1350 - 1650	1494	1465	1571	1450	1650	1554	-	1538	1490	1536	-	-	1470
26	Manganese - Mn	2500 ± 25 µg/L	2250 - 2750	*	2400	2677	*	2530	*	-	2411	2390	2534	-	-	2405
27	Nickel - Ni	900 ± 9 µg/L	810 - 990	*	1008	950	910	930	890	-	910	890	895	-	-	892.0
28	Selenium- Se	1500 ± 15 µg/L	1285 - 1650	*	1536	*	*	*	*	-	1560	*	*	-	-	2482
29	Vanadium - V	150 ± 2 µg/L	135 - 165	*	150	159	200	170	*	-	152	*	151	-	-	145.0
30	Zinc - Zn	800 ± 8 µg/L	720 - 881	791	913	854	780	1000	782	-	810	750	809	-	-	827.0

\* The parameter is not detected by the laboratory

results are near the border limits and not counted as outlier

outlier results

**DETERMINATION OF DRINKING WATER ANALYSIS USING ULTRACHECK™ QUALITY CHECK SAMPLES**

**Appendix A: Summary of results**

S. No.	Parameters	Assigned/Reference Value	Advisory Range	Lab 49	Lab 2	Lab EX4	Lab 19	Lab EX10	Lab 28	Lab 79	Lab EX9	Lab 4	Lab G02	Lab 22	Lab IN02	Lab 37
<b>QIC-705A- Code72901</b>																
31	Aluminium -Al	3500 ± 35 µg/L	3092 - 3860	-	-	-	-	-	-	*	-	-	-	3204	3507	-
32	Arsenic- As	500 ± 5 µg/L	447 - 558	-	-	-	-	-	-	*	-	-	-	454	450	-
33	Cadmium - Cd	700 ± 7 µg/L	630 - 770	-	-	-	-	-	-	707	-	-	-	706	686	-
34	Chromium - Cr	300 ± 3 µg/L	270 - 330	-	-	-	-	-	-	306	-	-	-	288	289	-
35	Cobalt - Co	1000 ± 10 µg/L	900 - 1100	-	-	-	-	-	-	1006	-	-	-	1001	956	-
36	Copper - Cu	50 ± 1 µg/L	45 - 56	-	-	-	-	-	-	51	-	-	-	58	41	-
37	Iron - Fe	200 ± 2 µg/L	180 - 222	-	-	-	-	-	-	200	-	-	-	191	207	-
38	Lead - Pb	2500 ± 25 µg/L	2250 - 2750	-	-	-	-	-	-	2483	-	-	-	2477	2789	-
39	Manganese - Mn	100 ± 1 µg/L	90 - 110	-	-	-	-	-	-	100	-	-	-	97	118	-
40	Nickel - Ni	3000 ± 30 µg/L	2700 - 3300	-	-	-	-	-	-	2930	-	-	-	2992	3012	-
41	Selenium- Se	100 ± 1 µg/L	83 - 110	-	-	-	-	-	-	*	-	-	-	88	111	-
42	Vanadium - V	200 ± 2 µg/L	180 - 220	-	-	-	-	-	-	*	-	-	-	195	195	-
43	Zinc - Zn	800 ± 8 µg/L	720 - 881	-	-	-	-	-	-	799	-	-	-	815	778	-
The first number is the correctly determined parameters, the second is the total parameters determined by the laboratory				18/22	25/30	25/29	21/25	22/28	10/13	20/23	28/30	21/25	26/27	27/30	25/30	25/29

\* The parameter is not detected by the laboratory

results are near the border limits and not counted as outlier

outlier results

# Certificate of Analysis

**ULTRAcHECK™ Trace Metals #1 QC Sample**

**Catalog Number: QCI-705A**

**Code Number: 71356**

This ULTRAcHECK™ sample was gravimetrically prepared, and the analyte concentrations were confirmed using the analytical technique listed. Concentrations are traceable to the NIST standard reference materials (SRMs) listed. The reference value represents the determined value when the sample has been prepared according to instructions.

Analyte	Assigned Value	Analytical Method	NIST SRM	Advisory Range
aluminum	3500 ± 35 µg/L	ICP	3171a	3092 - 3860
arsenic	150 ± 2 µg/L	ICP	3103a	131 - 169
cadmium	750 ± 8 µg/L	ICP	3171a	675 - 825
chromium	200 ± 2 µg/L	ICP	3112a	180 - 220
cobalt	30.0 ± 0.3 µg/L	ICP	3113	26.4 - 33.1
copper	800 ± 8 µg/L	ICP	3114	720 - 880
iron	250 ± 3 µg/L	ICP	3171a	225 - 276
lead	1500 ± 15 µg/L	ICP	3128	1350 - 1650
manganese	2500 ± 25 µg/L	ICP	3132.0	2250 - 2750
nickel	900 ± 9 µg/L	ICP	3136	810 - 990
selenium	1500 ± 15 µg/L	ICP	3149	1285 - 1650
vanadium	150 ± 2 µg/L	ICP	3165	135 - 165
zinc	800 ± 8 µg/L	ICP	3168a	720 - 881

\* Calculated from the NELAC Non-Potable Water Fields of Testing Document, effective 1/1/09.



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William J. Leary  
Quality Assurance Manager

# Certificate of Analysis

**ULTRAcHECK® Trace Metals #1 QC Sample**

**Catalog Number: QCI-705A**

**Code Number: 72901**

This ULTRAcHECK® sample was gravimetrically prepared, and the analyte concentrations were confirmed using the analytical technique listed. Concentrations are traceable to the NIST standard reference materials (SRMs) listed. The reference value represents the determined value when the sample has been prepared according to instructions.

Analyte	Assigned Value	Analytical Method	NIST SRM	Advisory Range
aluminum	3500 ± 35 µg/L	ICP	3171a	3092 - 3860
arsenic	500 ± 5 µg/L	ICP	3103a	447 - 558
cadmium	700.0 ± 7.0 µg/L	ICP	3171a	630.0 - 770.0
chromium	300 ± 3 µg/L	ICP	3112a	270 - 330
cobalt	1000 ± 10 µg/L	ICP	3113	900 - 1100
copper	50 ± 1 µg/L	ICP	3114	45 - 56
iron	200 ± 2 µg/L	ICP	3171a	180 - 222
lead	2500 ± 25 µg/L	iCP	3128	2250 - 2750
manganese	100 ± 1 µg/L	ICP	3132.0	90 - 110
nickel	3000 ± 30 µg/L	ICP	3136	2700 - 3300
selenium	100 ± 1 µg/L	ICP	3149	83 - 110
vanadium	200 ± 2 µg/L	ICP	3165	180 - 220
zinc	800 ± 8 µg/L	ICP	3168a	720 - 881

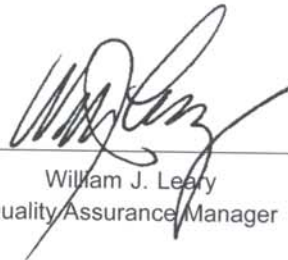
\* Calculated from the NELAC Non-Potable Water Fields of Testing Document, effective 1/1/09.



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Quality Assurance Manager

# Certificate of Analysis

**Minerals Sample**

**Catalog Number: QCI-710**

**Code Number: 70752**

This ULTRACheck® sample was gravimetrically prepared, and the analyte concentrations were confirmed using the analytical technique listed. Concentrations are traceable to the NIST standard reference materials (SRMs) listed. The reference value represents the determined value when the sample has been prepared according to instructions.

Test	Reference Value		Analytical Method	NIST Traceability	Advisory Range*
Alkalinity (CaCO <sub>3</sub> )	399 ± 3	mg/L	EPA Method 310.1	84j	359 - 439
Conductivity @ 25°C	1210 ± 1	µmhos/cm	EPA Method 120.1	3193	1140 - 1280
pH @ 25°C	9.15 ± 0.01		EPA Method 150.1	185g, 187c	8.95 - 9.35
Chloride	11.6 ± 0.04	mg/L	EPA Method 300.1	N/A	10.0 - 14.2
Fluoride	2.54 ± 0.01	mg/L	EPA Method 300.1	3183	2.25 - 2.84
Sulfate	194 ± 1	mg/L	EPA Method 300.1	3181	172 - 214
Nitrate as N	9.62 ± 0.15	mg/L	EPA Method 300.1	3185	8.18 - 10.92
Sodium	200 ± 2	mg/L	EPA Method 200.7	3152	180 - 220
Potassium	154 ± 1	mg/L	EPA Method 200.7	3141	138 - 173


\* Calculated from the NELAC Non-Potable Water Fields of Testing Document, effective 1/1/09.



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# Certificate of Analysis

**Water Hardness Sample**

**Catalog Number: QCI-720**

**Code Number: 78566**

This ULTRAcHECK™ sample was gravimetrically prepared, and the analyte concentrations were confirmed using the analytical technique listed. Concentrations are traceable to the NIST standard reference materials (SRMs) listed. The reference value represents the determined value when the sample has been prepared according to instructions.

Test	Reference Value	Analytical Method	NIST Traceability	Advisory Range*
Calcium	50.1 ± 0.5 mg/L	ICP	3109a	45.1 - 55.1
Magnesium	48.8 ± 0.5 mg/L	ICP	3131a	43.9 - 53.8
Total Hardness (as CaCO <sub>3</sub> )	326 ± 3 mg/L	ICP	3109a & 3131a	293 - 359

\* Calculated from the NELAC Non-Potable Water Fields of Testing Document, effective 1/1/09.



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See Reverse For Additional Information



William J. Leary  
Quality Assurance Manager

# Certificate of Analysis

ULTRACheck® Corrosivity QC Sample

Catalog Number: QCI-717

Code Number: 77369

This ULTRACheck® sample was gravimetrically prepared, and the analyte concentrations were confirmed using the analytical technique listed. Concentrations are traceable to the NIST standard reference materials (SRMs) listed. The reference value represents the determined value when the sample has been prepared according to instructions.

Analyte	Assigned Value	Analytical Method	NIST SRM	Advisory Range*
alkalinity (as CaCO <sub>3</sub> )	34.2 ± 0.3 mg/L	EPA Method 310.1	84j	30.8 - 38.2
calcium hardness(as CaCO <sub>3</sub> )	136 ± 1 mg/L	ICP	3109	121 - 151
pH	9.18 ± 0.01 units	EPA Method 150.1	185g, 187c	8.98 - 9.38
total filterable residue	388 ± 7 mg/L	EPA Method 160.1	gravimetric	249 - 526
sodium	15.7 ± 0.2 mg/L	ICP	3152	13.8 - 17.3

\* Calculated from the NELAC Drinking Water Fields of Testing Document, effective 1/1/09.



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